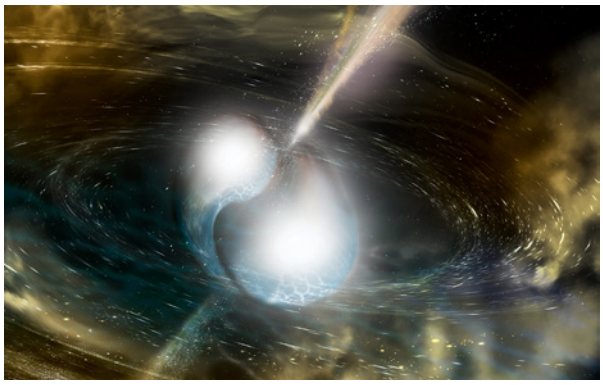
Quick Reads From NSF.gov

March 5, 2019

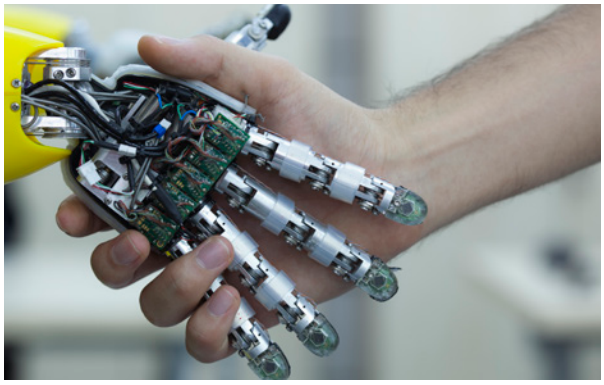
01



Upgraded LIGO to search for universe's most extreme events

NSF is awarding Caltech and MIT $20.4 million to upgrade the Laser Interferometer Gravitational-Wave Observatory (LIGO), building on the agency's four-decade investment, which has totaled more than $1 billion to date. Funded through a cooperative agreement, Advanced LIGO Plus will increase the volume of deep space the observatory can survey by as much as seven times. This investment is part of a joint international effort in collaboration with UK Research and Innovation and the Australian Research Council, which are contributing additional funds. Advanced LIGO Plus operations are expected to begin in 2024. Find out more in this NSF press statement.

02



Statement on executive order to maintain American leadership in artificial intelligence

President Donald J. Trump is expected to sign an executive order Feb. 11, titled "Maintaining American Leadership in Artificial Intelligence." The order aims to promote sustained investment and innovation in artificial intelligence (AI), enhance access to resources for AI research, and train a next generation AI research workforce. NSF Director France Córdova, who will participate in the signing ceremony, issued an official press statement.

03

Climate change makes summer weather stormier yet more stagnant

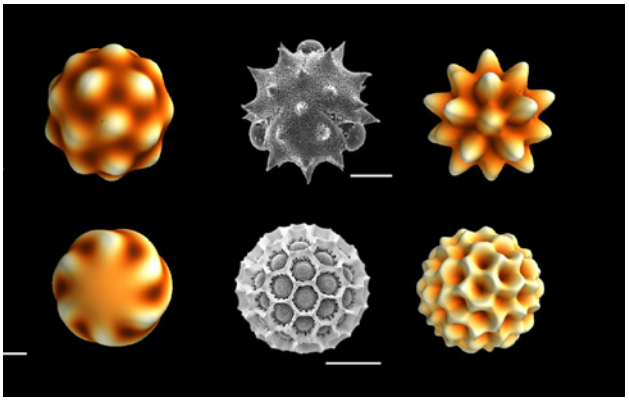
Climate change is shifting the energy in the atmosphere that fuels summertime weather, which may lead to stronger thunderstorms and more stagnant conditions for midlatitude regions of the Northern Hemisphere, including North America, Europe and Asia, a new MIT study finds. The scientists report that rising global temperatures, particularly in the Arctic, are redistributing the energy in the atmosphere, fueling thunderstorms and other local, convective processes, while less energy is going toward summertime extratropical cyclones -- larger, milder weather systems that circulate across thousands of kilometers -- systems normally associated with winds and fronts that generate rain. Learn more in this NSF News From the Field.

04

West Antarctica ocean drilling expedition will reveal climate history in region with significant ice loss

The West Antarctic Ice Sheet in the Amundsen Sea off Antarctica could play a pivotal role in future sea level rise, but many questions remain unanswered, scientists say. Now, researchers taking part in an international ocean drilling expedition funded by NSF and international partners are on Antarctica's remote Amundsen Sea looking for clues through an analysis of the ice sheet's history. Led by researchers at the University of Houston and the Alfred Wegener Institute for Polar and Marine Research, International Ocean Discovery Program Expedition 379 left Punta Arenas, Chile, on Jan. 23 for a two-month trip to Antarctica on the scientific drillship *JOIDES Resolution*. The ship has now arrived at the Amundsen Sea. Find out more in this NSF news release.

05



The physics underlying complex biological architectures

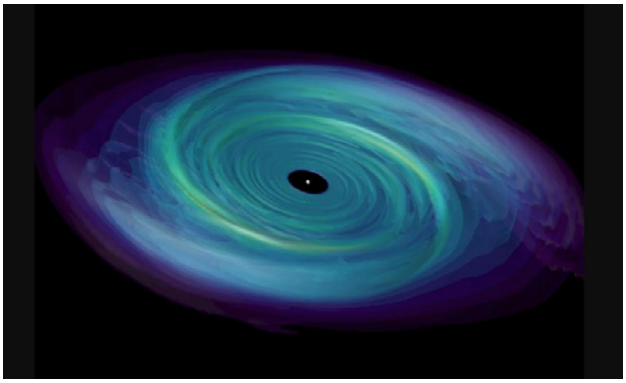
Beautifully crafted architecture isn't limited to human-made structures. Nature is rife with ornate structures, from the spiraling fractal patterns of seashells to the intricately woven array of neurons in the brain. In a new study, physicists developed a model that describes how patterns form on pollen spores. This is the first physically rigorous framework that details the thermodynamic processes that lead to these complex biological architectures. Learn more in this NSF News From the Field.

06

Zwicky Transient Facility spots a bumper crop of supernovae, black holes and more

The Zwicky Transient Facility (ZTF), an automated sky survey project based at Caltech's Palomar Observatory near San Diego, California, has produced its first bounty of new results since officially beginning operations in March 2018. The new instrument has discovered 50 small near-Earth asteroids and more than 1,100 supernovae, while observing more than 1 billion stars in the Milky Way galaxy. "The start of routine operations of ZTF marks a new era in our ability to capture the nightly and hourly changes transpiring in the universe," says Anne Kinney, assistant director for NSF's mathematical and physical sciences. "They are now recording real-time events from distant supernovae to nearby asteroids and are poised to discover the violent mergers and explosions generating gravitational-wave events." Find out more in this NSF News From the Field.

07



Novel experiment validates widely speculated mechanism behind the formation of stars

How have stars and planets developed from the clouds of dust and gas that once filled the cosmos? A novel experiment at the Princeton Plasma Physics Laboratory has demonstrated the validity of a widespread theory known as "magnetorotational instability," or MRI, that seeks to explain the formation of heavenly bodies and confirmed an important mechanism involved in star formation. Find out more in this NSF News From the Field.

08

Hurricanes in 2017 did not greatly damage corals, but reefs were already in trouble

Marine biologist Peter Edmunds was prepared for the worst. Back-to-back Category 5 hurricanes had torn through the Caribbean in September 2017. The scientist and his colleagues weren't sure what they'd find when they visited fragile coral reefs near the island of St. John after the storms. Decades of reef degradation created a coral community that was resistant to the devastation usually seen after severe storms like hurricanes Irma and Maria, which hit the Caribbean and Eastern United States in the fall of 2017. "The expectation was that the hurricanes were going to be devastating for the reefs of St. John," Edmunds said. "But we found that impacts on the stony coral communities were minor. The reef and its corals had become so degraded that the hurricanes did not affect them as much as we anticipated." Find out more in this NSF Discovery.

09

Research immerses HBCU undergrads in biomedical engineering

For Americans over 65, falls are the leading cause of injury-related death. With increases in average life expectancy, the importance of balance training methodologies and assistive technologies towards maintaining overall health and improving balance, as well as preventing falls, has significant societal relevance. The goal of this research, which is being conducted at the University of the District of Columbia, a historically black college and university (HBCU), is to gain new knowledge about how bodyweight supportive versus sensory training can improve one's balance to ultimately reduce the number of falls in older individuals. Find out more in this NSF Science Nation.

10

20-million-year-old tusked sea cow is Central America's oldest marine mammal

A researcher searching the shoreline of the Panama Canal for fossil plants instead found an ancient sea cow. An "emergency fossil excavation" due to rising water levels yielded a remarkably complete skeleton of a new genus and species of dugong, Culebratherium alemani, a tusked seagrass-grazing relative of modern dugongs, estimated to be about 20 million years old, the first evidence of a marine mammal from the Pacific side of the canal. Find out more in this NSF News From the Field.

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